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THE GENUS *ELODIUM* (BRYOPHYTA, HELODIACEAE): A HISTORY AND NEW COMBINATIONS

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ABSTRACT

The Code does not recognize as orthographic variants names only differing by an initial "h" representing the spiritus asper, thus *Elodium* (Sull.) Austin and *Helodium* Warnst. (conserved against *Helodium* Dumort.) are both legitimate names as they have different types. If included in the same genus, *Elodium* takes precedence by Art. 14.5. The complex history of treatment of the spelling in the literature is summarized. *Thuidium elodioides* Renauld & Cardot ex Roell, usually recognized as a variety, is transferred to *Elodium* at the species level on the basis of new traits. New combinations are **Elodium elodioides** (Renauld & Cardot ex Roell) Eckel and **Elodium blandowii** (F. Weber & D. Mohr) Eckel.

KEY WORDS: *Elodium, Helodium, Elodium elodioides, Helodium blandowii,* spiritus asper

In the 2006 Vienna Code of Botanical Nomenclature, recommendations 60A1 and 2 state that transliteration of Greek words into Latin for new taxonomic names and epithets should conform to classical usage. The rough breathing sign, or spiritus asper, provided for Greek vowels and diphthongs and the letter "r" that begin a word should be transcribed in Latin as the letter "h." Note that this recommendation is not an authorization to change all generic names derived from Greek words beginning with a spiritus asper (h-sound), as Robert Brown's generic name *Eleocharis* (also derived from the Greek word for swampy ground (h)elos) has not been altered since its publication (Stearn 1983), and the Code (Art. 10.3, ex. 3) remarks that the protologue of *Elodes* Adans. (1763) included references to "*Elodes*" of Clusius (1601), without changing either to *Helodes*.

In 1856, W.S. Sullivant published section *Elodium* under the genus *Hypnum*, which would accommodate his new species "*Hypnum paludosum*, Sulliv." from North America—a plant that does not occur in Europe (Hill et al. 2006). The name is derived from the Greek adjective *(h)elōdēs,-es,* 'marshy, fenny,' the adjective derived from the noun *(h)elos,-eos (s.n.III)* "the low ground by rivers, a marsh-meadow, marsh" (Liddell & Scott 1997), descriptive of the habitat of this moss. In Greek, the initial epsilon (e) often has the spiritus asper, hence taxonomic names derived from this Greek word should be preceded by an "h": *helodes, or helos,-eos*.

It is curious that Sullivant did not spell the section with an initial "h," as he appears to have been proficient in classical languages, but he is not alone in preparing generic names this way. The spiritus asper and spiritus lenis (smooth breathing, absence of an h sound) often are accompanied by an accent at the beginning of a Greek word. It is easy to see this as a type-setter's nightmare, especially in small, cheap, and popular versions of classical Greek dictionaries of the nineteenth century wherein smudgy inks and poor paper may make these marks ambiguous. That, coupled with the use of candles, poorly ground eye-glasses, and weak eyes played the devil with then contemporary taxonomists. It might be safer to assume a Greek word has no spiritus asper than to put one in when (hastily) preparing a manuscript for the printer.

Sullivant, 1864

Apparently Sullivant knew of a moss species in North America (whether *Hypnum* or *Thuidium*) with *blandowii* as an epithet, but such did not appear in his 1856 text. In 1864, however, Sullivant remarked that *Hypnum paludosum* Sull. "Resembles *H Blandowii*, with which it is not unfrequently confounded: but that species is a *Thuidium*, Bryol. Europ. ..." (Sullivant 1864). So it was known to Sullivant that *Hypnum blandowii* occurred in North America, but he did not place it in his section *Elodium* or anywhere else.

Austin, 1870

Austin (1870) treated *Elodium* as a genus when he identified number 306 of his Musci Appalachiani exsiccat as *"Elodium paludosum,"* citing Sullivant's 1864 treatment in the Icones Muscorum (on page 157, as *Hypnum paludosum* Sull.). Previously, the name of Austin's taxon was *Hypnum paludosum* Sull. Austin apparently did not know that the name *Hypnum paludosum* Sull. was an illegitimate name, being a later homonym of *Hypnum paludosum* (Hedw.) P. Beauv., and had to be rejected. That left *Elodium paludosum* Austin as the accepted name.

Austin included a note in Latin intended to credibly establish his genus: "*Foliis saepe papillosis: an Thuidii species*?" It perhaps should be noted that Austin was not sure whether "*Elodium*" would not better be subsumed under the genus *Thuidium*. *Elodium paludosum* Austin is then the type species of the genus *Elodium*. Austin also added a description in Latin for his new variety *Fontinalis lescurii* var. *cymbifolia* Austin (number 248), a name still in use today. Also note that in Austin's volume the genus *Omalia* by Bridel existed, for which the orthography was later conserved as *Homalia,* from another Greek adjective *(h)omalos,* referring to the flat leaves, with an initial spiritus asper.

Lindberg, 1879

In Europe, Lindberg (1879) in his checklist of the Scandinavian flora, transferred Sullivant's sectional name "*Elodium"* to a subgenus of *Thuidium*. The species *Thuidium blandowii,* occurring in both North America and Europe, was the only species he recognized in the section.

Lesquereux and James, 1895

Lesquereux and James (1895), in the United States, persisted in the use of *Thuidium* and *Elodium* as subgenera of the genus *Hypnum,* with *Hypnum blandowii* F. Weber & D. Mohr under the former section, and *Hypnum paludosum* Sull. under the latter. These authors cited Sullivant's exsiccat specimen no. 7 from the Musci Allegheniense*s* (Sullivant 1845), the Mosses of the United States (Sullivant 1856: 68), and the Icones Muscorum (Sullivant 1864: 157). There is no indication that they were aware of Austin's generic name (*Elodium).*

Warnstorf, 1905

Warnstorf (1905) then used the name *Helodium* for a genus using the authorities (Sull.) Lindb. Lindberg earlier (1879) had used *Elodium* as a subgenus of the genus *Thuidium*. Both of the cited authorities used the name "*Elodium*" and Warnstorf would have also, but he changed the orthography, as he wrote in a footnote, because of the spiritus asper with which the Greek word *(h)elos* was spelled. *Helodium* was to be pronounced that way, and transliterated into Latin that way. So, apparently, bibliographically, Austin's name preceded Warnstorf's name and Warnstorf's name was considered by Warnstorf as only an orthographic variant of Austin's, which Warnstorf corrected. The genus was cited by Warnstorf as *Helodium* (Sull.) Lindb. Also, when Warnstorf changed the spelling, he created a later homonym for a vascular plant genus *Helodium* Dumort., an issue that resulted later in the conservation of Warnstorf's name over Dumort's. Through conservation, the generic name became *Helodium* Warnst. Also, through conservation, the type species was made

Helodium blandowii (F. Weber & D. Mohr) Warnst. The generitype of *Elodium* remained *E. paludosum* Austin.

Grout, 1934

Grout (1934), in a footnote to his treatment of the moss genus *Helodium* in North America, also corrected *Elodium* to *Helodium*, for he wrote "The Greek-derived *elodes* demands the aspirate in Latin according to classical authorities." Grout mistakenly cited Sullivant's *Elodium* as a subgenus, rather than a section. His footnote seems redundant, as Warnstorf, cited by Grout as the author of the genus name *Helodium*, had already established the corrected spelling. It is more likely, however, that Grout's footnote applied more to correcting the spelling of another taxon, for which he made the combination in his paper *Helodium blandowii* var. *helodioides* (Renauld & Cardot) Grout.

This variety was originally published as *Thuidium elodioides* by Renauld and Cardot (in Roell 1893), based on specimens from North America. In the protologue to that species, the authors make clear that their new species is similar to (Austin's) *Elodium paludosum*, and so the epithet of the new species was intended to allude to a resemblance to a species with the genus name *Elodium*. At that time, the only person to recognize *Elodium* as a generic name was Austin. The authority of the species *Elodium paludosum* was not given by the authors, had they known of Austin's genus, the authorities would have been (Sull.) Austin.

Thuidium elodioides was subsequently reduced to a variety of *Thuidium paludosum* by Best (1896), retaining the initial "e" in the varietal epithet. Later, Grout (1929) transferred the variety *Helodium paludosum*, mistakenly attributing the authority to Best, when it was Grout himself that was the authority. Grout republished the corrected authorial citation in a subsequent publication as *Helodium paludosum* var. *helodioides* (Renauld & Cardot) Grout, with an initial "h" (Grout 1934).

Grout's corrected citation in 1934 also included attaching the initial "h" to the spelling of the varietal name, which he justified as based on classical usage (the spiritus asper before the epsilon of elōdēs)—essentially a reiteration of Warnstorf's correction of the generic name (from *Elodium* to *Helodium*) (Warnstorf 1905). However, the correct citation of this variety, whose changed status was authored by Grout, is *Helodium paludosum* var. *elodioides* (Renauld & Cardot) Grout.

Little, 1943

Little (1943) discussed the genus *Helodium* as a possible later homonym of Austin's generic name *Elodium* when Austin established *Elodium paludosum* as a new combination (Austin 1870). Little determined that "There is no indication that a new genus was intended" by Austin when Austin made his short citation in "this book" being "just a printed copy of the labels of Austin's specimens of mosses ... ." Little suggested that Austin's name was "improperly published" and he questioned whether Austin created a "new monotypic genus with a species transfer," i.e. from Sullivant's *Hypnum paludosum* to Austin's *Elodium paludosum*. It was because Grout (1934) cited Warnstorf's rendition "*Helodium*" as validly published that Little rejected Austin's contribution as an "irregularly published name." Little stated that "the genus was not considered [by Grout] as validly published until 1905." It seems unfair to attribute irregularity to Austin's publication when other taxa have been and are still recognized from the same book (Austin 1870), such as the variety *cymbifolia* of *Fontinalis lescurii* mentioned above. Other authors, such as Sullivant, used Austin's exsiccat to publish new combinations, such as *Anoectangium peckii* (Sull.) Sull. ex Austin, a combination accompanied by a Latin description. As to this, Grout's transfer, mentioned above, of Best's *Thuidium paludosum* var. *elodioides* (Renauld & Cardot) Best to *Helodium paludosum* var. *elodioides* (Renauld & Cardot) Grout was not considered invalid and Grout's 1929 publication was not "irregular" even though the text was a simple list of names and the nomenclature was somewhat informal.

Crum, Steere, Anderson, 1965, 1981

In 1965, Crum, Steere and Anderson published a continuation of nomenclatural changes in preparation for their checklist of North American mosses. In it *Thuidium elodioides* Renauld & Cardot ex Roell was transferred to another species as a variety: *Helodium blandowii* (F. Weber & D. Mohr) Warnst. var. "*helodioides*" (Renauld & Cardot ex Roell). The epithet Renauld and Carot used was "*elodioides*" and so one would think the new varietal epithet would be spelled the same way. For some reason it was not. Also, when Crum and Anderson presented the variety in 1981 in their Mosses of Eastern North America, the varietal epithet was spelled "*elodioides.*" The authors remarked that "The original spelling of the epithet "*elodioides*" is the correct form, and very likely the generic name should be spelled *Elodium,* except for conservation of *Helodium* Warnst. against the earlier *Elodium (*Sull.) Aust. and *Hypnum s*ect. *Elodium* Sull." The authors perhaps had taken the view that the intention of the authors of taxonomic names took precedence over classical usage, or classical orthography. Whether Sullivant intended to omit the initial "h" in his sectional name "*Elodium,*" it appears to be assumed that this was not an error on Sullivant's part. Certainly when Austin created the genus *Elodium,* the generic orthography was not based on classical usage but on Sullivant's sectional name. Renauld and Cardot's epithet for *Thuidium elodioides* makes clear reference to the generic name *Elodium* associated with Sullivant's section *Elodium* of *Hypnum* and Austin's genus *Elodium* and subsequent species *Elodium paludosum.* In other words, the choice of whether to spell with an "h" seemed to Crum and Anderson to reside in the author's citation of nomenclature, not classical words. Crum and Anderson lent weight to a presumed intention of Sullivant to create a name that ignored the spiritus asper of the Greek orthography.

However, as Crum and Anderson related, it is the conservation of Warnstorf's name *Helodium* that settled the issue. The conservation of *Helodium* Warnst., however, was not "against the earlier *Elodium* (Sull.) Aust. and *Hypnum* sect. *Elodium* Sull." but rather against another generic name with the identical spelling, *Helodium* Dumort. This genus was not a bryophyte but a dicotyledonous vascular plant in the Umbelliferae described in 1827 (now *Helosciadium*; McNeill 2006). According to the Code, the type of *Helodium* Warnst. is *Helodium blandowii* (F. Weber & D. Mohr) Warnst., which totally removes Austin's name *Elodium* and its type (*Elodium paludosum* Aust.).

If Warnstorf had not altered the spelling of *Elodium* to *Helodium*, there would have been no later homonym issue with Dumortier's earlier name of the same spelling and no need for conservation. Warnstorf, then, would have used *Elodium* as the generic name, and it would have been recognized at some point that Austin already had coined that name. Austin would then have been the authority, and *Elodium paludosum* the type species for it. Even though *Helodium* and *Elodium* are philologically identical names, in the context of the Code they are not homotypic synonyms and both names are now based on different types.

Conservation of *Helodium* Warst.

Whether one agrees with the above summation or not, the issue was closed when Warnstorf's genus *Helodium* was conserved against an earlier homonym by Dumortier for a species of vascular plant. Two more taxonomic authorities added to their views on the genus *Helodium* and its preferred spelling (with an initial "h") and the matter appeared to be closed. However, the entire issue was raised again by Crum and Anderson in 1981, who suggested the correct form for the epithet of *Helodium blandowii* var. *elodioides* was to be spelled without the initial "h" and that the generic name should be spelled *Elodium* except for the conservation of Warnstorf's corrected name as "*Helodium.*" The authors, however, did not raise this issue again in subsequent publications. Crum et al. (1965) transferred the var. "*elodioides*" from a variety of *Helodium paludosum* to a variety of *H. blandowii.* For this transfer they spelled the epithet "*helodioides.*" In their 1981 publication they wrote it "*elodioides*" with their justification. However, in the two checklists of the mosses of North

America to which these authors contributed (Crum et al. 1973; Anderson et al. 1990), both times the epithet was spelled "*helodioides*" (in both the main catalogue and the synonym list), and the issue of the alternate spellings was not revisited.

According to ICBN Art. 14.5, "When a conserved name competes with one or more names based on different types and against which it is not explicitly conserved, the earliest of the competing names is adopted. ... ." Given that the two generic names are considered different by the Code (e.g., *Homalium* is conserved against *Omalium*) and that they have different types, the two generic names *Elodium* (Sull.) Austin and *Helodium* Warnst. are legitimate.

The complex history of *Thuidium elodioides* Ren. & Card. ex Roell

Thuidium elodioides Renauld & Cardot ex Roell was originally published by Renauld and Cardot in 1893. The new species was assigned to the genus *Thuidium*, not *Elodium* although it shared characteristics of both genera (hence the epithet "*elodioides*" in the genus *Thuidium*). The authors indicated that the habit of *Thuidium elodioides* is similar to that of *Elodium paludosum,* but that the new species differed by the leaves more shortly acuminate, by the cauline leaves fimbriate at the base, and by the shorter cells, which are elliptic and oval and papillose (Roell 1893). *Helodium paludosum* (Aust.) Broth. essentially does not have fimbriations along the basal margins of the leaves and where they appear to have them, it is generally due to stem cells covered with paraphyllia that strip off with the leaves at the insertion but are not a part of the leaf itself.

Renault and Cardot indicated that the new species in turn is distinguished from *Thuidium blandowii* by the habit more slender, the stems [branches] more remote and less regularly pinnate, the cauline leaves narrower, the cells more lax, the paraphyllia shorter, and the perichaetial leaves narrower, entire, very long-subulate. The type specimen was sterile, but a specimen had been very recently found in Ohio, around New-Bremen, with old and younger pedicels (setae) but apparently without capsules. They declared that *Thuidium elodioides* was an excellent (ausgezeichnete) species right in the morphological middle between *Elodium paludosum* and *Thuidium blandowii.*

Three years later, Best (1896) in his treatment of *Thuidium* reduced *Thuidium eloidioides* to a variety. The genus *Helodium* in North America was not recognized by this author, and both species (*H. paludosum* and *T. blandowii*) were placed in a subgeneric category of *Thuidium* named *Heterothuidium,* perhaps to emphasize the rather strong differences between the two species in it and the rest of the genus (*Euthuidium*). The author obviously thought to align *Thuidium elodioides* with *T. paludosum*, rather than *T. blandowii* although his description of the variety does not give the reason he used to suggest it to be nearly within the variation of *Thuidium paludosum.* The author found the variety "with the type," i.e. the typical variety of *Thuidium paludosum*, and estimated, at that time, the variety to be "more common from New York (E.G. Britton) westward. Indiana (Schuh)." The original locality was from Hobart, Indiana, along the Calumet River, with mention of a specimen from Ohio (Roell 1893).

Crum et al. (1965) published a continuation of nomenclatural changes in preparation for their checklist of North American mosses and in it the variety *helodioides* [sic] was transferred to the species *Helodium blandowii* (F. Weber & D. Mohr) Warnst. as *Helodium blandowii* var. *helodioides* (Renauld & Cardot ex Roell) H.A. Crum, Steere, & L.E. Anderson. When the variety was subsequently cited by Crum and Anderson (1981) in their Mosses of Eastern North America, the authors decided to remove the initial "h" in the orthography of both the variety and, erroneously, in the 1965 new combination. In the treatment of the new variety by Crum and Anderson (1981), there is no discussion regarding evidence used to associate the variety *(h)elodioides* with *Helodium blandowii* rather than *H. paludosum.* The distribution of the variety seems to overlap more with the south-ranging *H. paludosum* in its east-central, Great Lakes, and eastern seaboard area rather than

with the more widespread northern-boreal to southwestern North American distribution of *H. blandowii*. There is no such variety noted in the European variation of that species (Hill et al. 2006).

The taxonomic placement of *Thuidium elodioides*

Superficially, the var. *(h)elodioides* does have characters resembling *Helodium blandowii* as originally discussed in 1893 by Renauld and Cardot. But it also has many of the characters of *H. paludosum*. While preparing a treatment of the genus for the Flora of North America, two additional characters quite conservative in other, related taxa were identified for the variety: it possessed a stem central strand as does *H. paludosum* (but not *H. blandowii*) and the seta and capsule dimensions are also only consistent with those of *H. palusodum*. These characters make this taxon unlikely to be part of the variation *of H. blandowii* nor is there intergradation. The characters of var. *eloidioides* mentioned above that it shares with *Helodium blandowii* clearly distinguish it from *H. paludosum*. All three species belong in the genus *Elodium* (Sull.) Austin, of which the later *Helodium* Warnst. is a taxonomic synonym following Art. 14.5.

Needed new combinations

Elodium elodioides (Renauld & Cardot ex Roell) Eckel, comb. nov. **BASIONYM**: *Thuidium elodioides* Renauld & Cardot ex Roell, Hedwigia 32: 308. 1893. *Thuidium plaudosum* var. *elodioides* (Renauld & Cardot ex Roell) Best, Bull. Torrey Bot. Club 23: 90. 1896. *Elodium paludosum* var. *elodioides* (Renauld & Cardot ex Roell) Best, Man. Mosses W. Pennsylvania 262. 1913. *Helodium paludosum* var. *elodioides* (Renauld & Cardot ex Roell) Grout, Check List Pleuroc. Moss. N. Amer. 23. 1929. *Helodium blandowii* var. *elodioides* (Renauld & Cardot ex Roell) H.A. Crum, Steere, & L.E. Anderson, Bryologist 68: 432. 1965 (1966) as "*helodioides*."

Elodium blandowii (F. Weber & D. Mohr) Eckel, comb. nov. **BASIONYM**: *Hypnum blandowii* F. Weber & D. Mohr, Bot. Taschenbuch 332. 1807. *Leskea blandowii* (F. Weber & D. Mohr) Mitt., J. Proc. Linn. Soc., Bot. 8: 44. 1864. *Thuidium blandowii* (F. Weber & D. Mohr) Schimp., Bryol. Eur. 5: 166. 486 (Fasc. 49–51 Mon. 10. 6). 1852. *Helodium blandowii* (F. Weber & D. Mohr) Warnst., Krypt.-Fl. Brandenburg, Laubm. 692. 1905.

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